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**THE LIMITATIONS AND ADMISSIBILITY OF USING
HISTORICAL CELLULAR SITE DATA TO TRACK THE
LOCATION OF A CELLULAR PHONE**

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I. INTRODUCTION

[1] Imagine someone has just committed a crime. Shortly thereafter, law enforcement responds and quickly apprehends a suspect on the scene or close by. In order to prove guilt beyond a reasonable doubt, the time and place of apprehending the suspect, combined with witness testimony or physical evidence, may be enough for the prosecution to meet its burden of proof.

[2] Now imagine a longer, more complex investigation where law enforcement does not identify or apprehend a suspect for days, weeks, or even months after the crime occurred. Law enforcement gathers some evidence, but the evidence by itself is not enough to convict. If the prosecution can place the suspect in the vicinity of the crime scene at the time the crime occurred, then maybe it could corroborate other evidence to establish guilt.¹ However, if physical evidence or witnesses cannot place

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a defendant at a crime scene, then how else can the prosecution carry its burden?

[3] Law enforcement may attempt to place a suspect at a crime scene by subpoenaing and analyzing his or her cell phone records for the date and time of the crime.² Whenever a cell phone makes a call, the call is

J.D., Catholic University of America, Columbus School of Law. This article was written under the supervision of Professor Clifford Fishman of the Columbus School of Law in partial satisfaction of degree requirements. I would like to thank Cliff and Professor A.G. Harmon for their assistance in the research and writing of this article.

¹ See, e.g., Staunton v. State, 784 N.W.2d 289, 299-300 (Minn. 2010) (finding the defendant guilty after using evidence to place the defendant in the vicinity of the crime scene, and offering corroborating evidence).

² See, e.g., United States v. Barnes, 411 F. App'x 365, 369-70 (2d Cir. 2011); United States v. Sanchez, 586 F.3d 918, 926-29 (11th Cir. 2009); Williamson v. United States, 993 A.2d 599, 602 (D.C. Cir. 2010); Cooper v. State, 45 So. 3d 490, 492-93 (Fla. Dist. Ct. App. 2010) (upholding trial court's admission of expert testimony by Verizon Wireless store manager which used phone records to establish the defendant's location on the date and time the crime was committed); Pullin v. State, 572 S.E.2d 722, 725 (Ga. Ct. App. 2002); People v. Leak, 925 N.E.2d 264, 281-82 (Ill. App. Ct. 2010); State v. Wright, No. 9-794/09-1736, 2010 WL 200052, at *4-8 (Iowa Ct. App. Jan. 22, 2010); Canela v. State, 997 A.2d 793, 804 (Md. Ct. Spec. App. 2010) (admitting evidence through expert testimony to explain where defendant was located when certain calls were made); Staunton, 784 N.W.2d at 299-300 (upholding conviction in part based on testimony interpreting cell site data which corroborated defendant's commission of the crime); Francis v. State, 781 N.W.2d 892, 897-98 (Minn. 2010) (upholding conviction in part based on expert testimony placing the defendant in the general area of the shooting from cell site records); State v. Robinson, 724 N.W.2d 35, 61-69 (Neb. 2006); State v. Banks, Nos. 09AP-1087, 09AP-1088, 2010 WL 4793354, at *4-6 (Ohio Ct. App. Nov. 23, 2010) (finding no reversible error where trial court admitted into evidence expert testimony placing defendant at crime scene through interpretation of cell phone records); cf. State v. Silva, 2011 WL 31362, at *4,*9 (N.J. Super. Ct. App. Div. Jan. 6, 2011) (offering cell phone records to establish defendant's alibi defense); Dorsey v. Delcupp, No. 1 CA-CV 08-0472, 2010 WL 475454, at *2-4 (S.D.N.Y. Feb. 11, 2010) (denying motion for additional discovery for plaintiff to establish alibi claim through cell phone records).

routed through a cell site located at a fixed geographic location.³ Cellular companies keep records of which cell site processes a call, and through this information law enforcement can infer the location of the cell phone user.⁴ Ideally, this information places the suspect at the scene of the crime.⁵ However, the cell phone record cannot always place the suspect's location to a precise degree.⁶ Some courts have allowed police officers to testify and interpret cell site data, while other courts require expert testimony to admit such evidence.⁷

[4] This article will explore the limitations and admissibility of using historical cell site data to prove the location of a cell phone at the time a crime was committed. Part II will begin with an overview of how a cellular network works. Next, Part III will discuss the various ways a cell phone tracks its own location and the limitations of using historical cell site data as a tracking method. Part IV will analyze the admissibility of historical cell site data under the Federal Rules of Evidence, including its relevance, admission through lay witnesses, and admission through experts. Although this analysis applies the Federal Rules, additional examples will discuss how various State courts have dealt with these issues. Part V will discuss the constitutional implications of law enforcement seizing cell site data for a person's phone and presentation as

³ See CLIFFORD S. FISHMAN & ANNE T. MCKENNA, WIRETAPPING & EAVESDROPPING: SURVEILLANCE IN THE INTERNET AGE § 28:2 (2011).

⁴ See FISHMAN & MCKENNA, *supra* note 3, §§ 28:2, 29:38.

⁵ Cf. *Banks*, 2010 WL 4793354, at *4 (discussing how a criminal intelligence analyst with the Ohio Attorney General's office used cell phone information to create a map matching calls to a homicide location).

⁶ See *infra* Part III (discussing various conditions that may affect the accuracy of cell site tracking methods).

⁷ Compare *Banks*, 2010 WL 4793354, at *4 (admitting cell phone evidence through police testimony), with *Williamson*, 993 A.2d at 602 (admitting cell phone evidence through an expert witness), and *Cooper*, 45 So.3d at 493.

evidence in a criminal trial. Finally, Part VI will make suggestions for a party seeking to introduce or preclude historical cell site evidence.

II. OVERVIEW OF CELLULAR PHONE TECHNOLOGY

[5] A cellular phone operates as a two-way radio that transmits and receives signals throughout a cellular network.⁸ The design of a cellular network is divided into “geographic coverage areas called ‘cells,’” arranged in the pattern of a hexagonal grid or honeycomb.⁹ The point where three cells meet is called the cell site (or cell tower).¹⁰ The number of antennas operating on the cell site, the height of the antennas, topography of the surrounding land, and obstructions (both natural and man-made) determine the size of each cell’s coverage area.¹¹ One cell may cover an area up to thirty miles from the site, for a total coverage area of approximately 2,700 square miles.¹² Other cells may cover much smaller areas ranging from one to three miles from the site.¹³ Urban areas

⁸ See FISHMAN & MCKENNA, *supra* note 3, § 28:2.

⁹ See *In re Application of the United States for an Order for Prospective Cell Site Location Info. on a Certain Cellular Tel.*, 460 F. Supp. 2d 448, 450 (S.D.N.Y. 2006) [hereinafter *In re Application I*]; Cingular Wireless, L.L.C. v. Thurston Cnty., 129 P.3d 300, 303 n.3 (Wash. Ct. App. 2006).

¹⁰ See FISHMAN & MCKENNA, *supra* note 3, § 28:2.

¹¹ Nextel Commc’ns of the Mid-Atlantic, Inc. v. Town of Brookline, 520 F. Supp. 2d. 238, 242 (D. Mass. 2007); Nextel Commc’ns of the Mid-Atlantic, Inc. v. Town of Wayland, 231 F. Supp. 2d. 396, 399 (D. Mass. 2002).

¹² Transcript of Record at 129-30, State v. Davis, No. MMX-CR08-0185484T (Conn. Super. Ct. Oct. 4, 2010) [hereinafter Porter Hearing Tr.] (on file with the author). If the coverage area is thought of as a circle and furthest distance from the cell site where service is available is the radius of that circle, then the coverage area can be easily calculated by simple mathematics, $A = \pi r^2$. So, the example noted above would be $A = \pi(30)^2 \approx 2,700$. See *id.* at 130.

¹³ See, e.g., Perez v. State, 980 So.2d 1126, 1130-31 (Fla. Dist. Ct. App. 2008); State v. Saleh, No. 07AP-431, 2009 WL 840755, at * 3 (Ohio Ct. App. Mar. 31, 2009).

may have cell sites located every one-half to one mile, whereas more rural areas may have cell sites every three to five miles.¹⁴

[6] As long as a cell phone is turned on, it periodically transmits a signal to the network in order to scan the strength of every potential cell site.¹⁵ When a user places a call, the cell phone connects to the cell site with the strongest signal.¹⁶ Adjoining cells provide some overlap in coverage to avoid disconnection from the network when the signal strength of the site servicing the call drops by transferring the call to the next cell with the strongest signal.¹⁷ This primary feature of the cellular design, and crux of its business model, provides that one cell site will pick up a call and ensure it goes through when another goes down.¹⁸ This process is known as a “hand-off.”¹⁹ A hand-off may occur because the signal of the first cell weakens, as the user moves away from the site, and then subsequently strengthens after recognizing a closer cell.²⁰ Thus, handing-off will occur as a cell phone user moves throughout multiple

¹⁴ People v. Wells, No. A112173, 2007 WL 466963, at *2 (Cal. Ct. App. Feb. 14, 2007).

¹⁵ See *In re Application 1*, 460 F. Supp. 2d at 450; FISHMAN & MCKENNA, *supra* note 3, § 28:2.

¹⁶ Ameritech Mobile Commc’ns, Inc. v. Wisconsin Dept. of Revenue, No. 97-0068, 1997 WL 603432, at *1 (Wis. Ct. App. Oct. 2, 1997).

¹⁷ See *Town of Brookline*, 520 F. Supp. 2d. at 242 (D. Mass. 2007); *Town of Wayland*, 231 F. Supp. 2d. at 399 (D. Mass. 2002).

¹⁸ See Porter Hearing Tr., *supra* note 12, at 95; see also New York SMSA Ltd. v. Twp. of Mendham Zoning Bd. of Adjustment, 840 A.2d 901, 905 (N.J. Super. Ct. App. Div. 2004).

¹⁹ *Town of Brookline*, 520 F. Supp. 2d. at 242; *Town of Wayland*, 231 F. Supp. 2d. at 399.

²⁰ See Cingular Wireless, LLC v. Thurston Cnty., 129 P.3d 300, 303 n.3 (Wash. Ct. App. 2006); see, e.g., State v. Allen, No. 92482, 2010 WL 27548, at *5 (Ohio. App. Jan. 7, 2010).

coverage areas.²¹ However, the geographic location of the user is not the only reason for a call switching cells, since many other factors may affect the signal strength between a cell phone and site.²²

[7] First, the technical characteristics of cell sites may affect signal strength: (1) the number of sites available;²³ (2) maintenance or repairs being performed; (3) height of the cell tower; (4) height above sea level; (5) wattage output; and (6) range of coverage.²⁴ Second, technical characteristics of the antennas on cellular sites may affect signal strength, such as the number of antennas, the angle and direction the antenna is facing, height of each antenna, and call traffic processed through each antenna.²⁵ Third, technical characteristics of the phone, such as the wattage output and generation of the phone's broadband capability, may affect signal strength.²⁶ Fourth, signal strength may depend upon environmental and geographical factors, including the weather,

²¹ See *Town of Brookline*, 520 F. Supp. 2d. at 242; *Cingular Wireless*, 129 P.3d at 303 n.3.

²² See *infra* text accompanying notes 23-28 (listing factors affecting signal strength).

²³ See Comments of the Telecommunications Industry Association, Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114, *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, Association of Public-Safety Communications Officials-International, Inc. Request for Declaratory Ruling, CC Docket No. 94-102, 911 Requirements for IP-Enabled Service Providers, WC Docket No. 05-196, Notice of Proposed Rulemaking (rel. June 1, 2007) ("NPRM") at 3 (filed Aug. 20, 2007) [hereinafter Comments of the TIA], available at http://www.tiaonline.org/gov_affairs/fcc_filings/documents/TIAComments-E911.pdf.

²⁴ See Porter Hearing Tr., *supra* note 12, at 88-89.

²⁵ See Porter Hearing Tr., *supra* note 12, at 91-92.

²⁶ See Porter Hearing Tr., *supra* note 12, at 80.

topography, and level of urban development.²⁷ Finally, indoor or outdoor use of the phone may alter the strength of the signal.²⁸

[8] Usually, cellular companies record the cell site to which a phone connects for “benign purposes, such as determining whether roaming charges apply and tracking call volume by location.”²⁹ Recently, however, law enforcement has begun using cell site data to track the location of cell phones.³⁰

III. TRACKING CELLULAR PHONES

[9] There are three basic methods used to track cellular phones: (1) GPS (Global Positioning System) technology; (2) capturing real-time cell site data; and (3) interpreting historical cell site data.³¹ GPS is a system of satellites and ground receivers used to locate a receiver’s position.³² A GPS receiver can track in real-time or make a record of its location with accuracy up to a few meters.³³ GPS receivers are available to consumers and have applications available for cellular phones.³⁴ GPS is the most accurate way to track location, but can only track a cellular phone if the

²⁷ See Comments of the TIA at 3.

²⁸ See *id.*

²⁹ *In re Application 1*, 460 F. Supp. 2d at 451.

³⁰ See *id.*; *supra* note 2 and accompanying text.

³¹ See FISHMAN & MCKENNA, *supra* note 3, § 29:35, 29:38.

³² See generally Adam Koppel, Note, *Warranting a Warrant: Fourth Amendment Concerns Raised by Law Enforcement’s Warrantless Use of GPS and Cellular Phone Tracking*, 64 MIAMI L. REV. 1061, 1063-66 (2010).

³³ See FISHMAN & MCKENNA, *supra* note 3, § 29:35; Koppel, *supra* note 32, at 1063-64.

³⁴ See FISHMAN & MCKENNA, *supra* note 3, § 29:35; Martin A. Dolan et al., *Use of Cell Phone Records and GPS Tracking*, 24 CBA REC. 38, 39 (2010).

phone has GPS features.³⁵ Therefore, cell phones without GPS features can only be tracked through cell site information.³⁶

[10] Real-time cell site data is gathered as a cell phone constantly scans the cellular network for the site with the strongest signal.³⁷ Law enforcement can interpret the data to try and determine the present location of a cell phone.³⁸ Historical cell site data records the information a cellular company keeps on a phone and may show a history of prior location.³⁹ Law enforcement can use this data to place a suspect at the scene of a crime that has already been committed or track history of previous movement.⁴⁰ However, the method of interpreting cell site data will determine its accuracy.⁴¹ This article focuses on problems with interpreting cell site data.

A. Triangulation

[11] A cell phone's signal will often be received simultaneously by more than one cell site when operating in areas with a high concentration

³⁵ See FISHMAN & MCKENNA, *supra* note 3, § 28:2.

³⁶ See generally FISHMAN & MCKENNA, *supra* note 3, § 29:1 (explaining the tracking capabilities of GPS separately from the tracking capabilities of cell phones).

³⁷ See FISHMAN & MCKENNA, *supra* note 3, § 29:38; *supra* text accompanying note 10.

³⁸ See *In re Application of the United States for an Order Authorizing the Installation and Use of Pen Register and a Caller Identification Sys. on Tel. Nos. [Sealed]*, 402 F. Supp. 2d 597, 599 (D. Md. 2005) [hereinafter *In re Application 2*].

³⁹ See FISHMAN & MCKENNA, *supra* note 3, § 28:2.

⁴⁰ See FISHMAN & MCKENNA, *supra* note 3, § 28:2. (describing the process of triangulation).

⁴¹ See, e.g., FISHMAN & MCKENNA, at § 29:35 (describing the enhanced tracking capabilities of GPS technology).

of cell sites and overlaps in coverage.⁴² When this occurs, a mathematical process called triangulation may determine the phone's location if either: (1) three points receiving the signal are known; or (2) two points receiving the signal are known, along with the direction in which the cell site received the signal.⁴³ The accuracy of triangulation varies depending on a number of factors, such as the density of cell sites.⁴⁴ Urban areas tend to have a higher density of cell sites; therefore, triangulation is most feasible in those areas.⁴⁵

⁴² See *In re Application 1*, 460 F. Supp. 2d at 451.

⁴³ See *id.*; see also *id.* at 451, n.3 (providing a detailed discussion on the process of triangulation)

Triangulation is the process of determining the coordinates of a point based on the known location of two other points. If the direction (but not distance) from each known point to the unknown point can be determined, then a triangle can be drawn connecting all three points. While only the length of one side of the triangle is known at first (the side connecting the two known points), simple trigonometry reveals the lengths of the other sides and so the position of the third point. In the context of cell site information, the two known points are the antenna towers, the third point is the cellular telephone, and the direction from each tower to the phone is discerned from the information about which face of each tower is facing the phone.

Another method of tracking the location of cellular telephones, which also is sometimes called triangulation, is possible when a phone transmits signals to three antenna towers at once. Based on the strength of a phone's signal to a tower, and the time delay for the signal to reach the tower, one can determine the distance between the phone and the tower. One can then draw around the tower a circle, the radius of which is the distance from that tower to the phone. The location of the phone can be pinpointed by drawing circles around three of [sic] more towers and seeing where the circles intersect.

⁴⁴ *In re Application 2*, 402 F. Supp. 2d at 599, n.4.

⁴⁵ See *id.*; see also People v. Wells, No. VCR164967, 2007 WL 466963, at *2 (Solano Cnty., Cal. Feb. 14, 2007); see also *supra* text accompanying note 23.

[12] Although the Federal Communications Commission has mandated that, by September 11, 2012, network-based tracking for 911 calls must be accurate to within 100 meters for 67 percent of calls and 300 meters for 90 percent of calls,⁴⁶ some networks may not yet meet these requirements.⁴⁷ Also, non-emergency phone calls may not trigger the cellular network to record enough information to make triangulation possible.⁴⁸

B. Other Interpretations of Cell Site Data

[13] Often historical cell site records only indicate the date, time, and duration of calls, whether calls are inbound or outbound, and show the originating and terminating cell sites for calls received or placed on the phone.⁴⁹ Accordingly, triangulation cannot determine the location of the phone because either the phone connected with only one site (i.e., the originating and terminating cell sites are the same) or only two sites are known at different times (i.e., at the beginning and end of the call) without directional information.⁵⁰ This gap in the records occurs because no

⁴⁶ 911 Service, 47 C.F.R. § 20.18(h)(1) (2011).

⁴⁷ See, e.g., Sprint Spectrum, L.P. v. Zoning Bd. of Adjustment of the Borough of Paramus, No. 09-4940 (JLL), 2010 WL 4868218, at *5 (D. N.J. Nov. 22, 2010) (providing an example of a DAS network where triangulation of a cell phone is accurate to only a 1,000 foot radius).

⁴⁸ Cf. 47 C.F.R. § 20.18(b) (illustrating how the Federal Communications Commission only requires cellular providers to transmit “all wireless 911 calls” as opposed to all calls).

⁴⁹ See, e.g., United States v. Benford, No. 2:09 CR 86, 2010 WL 2346305, at *3 (N.D. Ind. June 8, 2010); *In re Application of the United States for an Order Authorizing the Disclosure of Prospective Cell Site Info.*, No. 06-MISC-004, 2006 WL 2871743, at *3, n.2 (E.D. Wis. 2006) [hereinafter *In re Application 3*]; Wilder v. State, 991 A.2d 172, 190 (Md. Ct. Spec. App. 2010); Declan McCullagh, *Feds Push for Tracking Cell Phones*, CNET NEWS (Feb. 11, 2010, 4:00 AM), http://news.cnet.com/8301-13578_3-10451518-38.html.

⁵⁰ See *supra* note 43 and accompanying text (illustrating how particular circumstances may prevent one from locating a phone using the process of triangulation).

business purpose exists for recording real-time cell site data,⁵¹ and cellular companies tend to only keep records of historical cell site data that are useful for billing purposes or to measure call traffic.⁵² An additional problem may arise in obtaining cell site data, because companies may only store data for six to twelve months before purging it from a cellular company's system.⁵³ If triangulation is not possible from the available records, then these records only show, at most, the phone's coverage areas at the beginning and end of the call.⁵⁴

[14] *Wilson v. State*, a decision of the Texas Court of Appeals, provides an example of this kind of interpretation.⁵⁵ In *Wilson*, an expert witness from Sprint used historical cell site data to place the defendant in the vicinity of the crime.⁵⁶ During trial, the expert testified the cell site that processes a call is “usually” the closest site to the person making the call.⁵⁷ The expert explained the cell site data from the defendant’s phone records reflected a map of his movements on the day in question.⁵⁸ She testified to four specific movements corroborating the defendant’s

⁵¹ McCullagh, *supra* note 49 (“Cellular providers tend not to retain moment-by-moment logs of when each mobile device contacts the tower, in part because there’s no business reason to store the data, and in part because the storage costs would be prohibitive.”).

⁵² See *In re Application 1*, 450 F. Supp. 2d at 451.

⁵³ McCullagh, *supra* note 49.

⁵⁴ See *In re Application 3*, at *3, n.2 (E.D. Wis. 2006).

⁵⁵ See generally *Wilson v. State*, 195 S.W.3d 193, 200-02 (Tex. App. 2006).

⁵⁶ See *id.* at 196-97.

⁵⁷ *Id.* at 200.

⁵⁸ *Id.*

involvement in the crime.⁵⁹ The Texas court ruled the expert's testimony was admissible and upheld the defendant's conviction.⁶⁰

IV. EVIDENTIARY ADMISSIBILITY OF CELL SITE DATA

A. Relevance

[15] Under the Federal Rules of Evidence, “[a]ll relevant evidence is admissible,” unless otherwise excluded by law, and irrelevant evidence is inadmissible.⁶¹ Relevant evidence is that which has “any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence.”⁶² “The Rule’s basic standard of relevance thus is a liberal one.”⁶³ Indeed, in a criminal trial, the identity of the defendant as the perpetrator is a fact of consequence necessary to secure a conviction.⁶⁴

⁵⁹ *Id.* (explaining how the accuracy of the last two movements was confirmed by the defendant’s contact with police and transport to the police station).

⁶⁰ See *Wilson*, 195 S.W.3d at 202, 205.

⁶¹ See FED. R. EVID. 402; see also FED. R. EVID. 402 advisory committee’s note (Proposed Rules) (“The exclusion of relevant evidence occurs in a variety of situations and may be called for by these rules, by the Rules of Civil and Criminal Procedure, by Bankruptcy Rules, by Act of Congress, or by constitutional considerations.”).

⁶² FED. R. EVID. 401.

⁶³ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 587 (1993).

⁶⁴ Cf. *McKinney v. Rees*, 993 F.2d 1378, 1384 (9th Cir. 1993) (admitting evidence regarding the defendant’s possession of a knife, notwithstanding its prejudicial nature, because it made “his identity as the murderer, more probable . . . ”).

[16] Relevant historical cell site data is offered to prove the phone's user is the perpetrator of a crime through the inference of location.⁶⁵ However, when triangulation is not possible, the problem with using historical cell site records under this evidentiary theory is that they "were never intended to and do not indicate location of the [cell phone] in relation to any cell site."⁶⁶ At best, these records can only narrow location to the geographic coverage area of the originating and terminating cell sites, rather than pinpoint the specific location of the cell phone.⁶⁷ It cannot be determined that the cell phone was closest to the site processing the call because factors other than geographic location can affect signal strength.⁶⁸

[17] A better theory on which to offer historical cell site data is not to prove where the phone user was at a specific time, but to prove where he or she could not have been. For example, in *United States v. Benford*, the United States District Court for the Northern District of Indiana ruled that an expert's testimony on historical cell site data was relevant to rebut the defendant's alibi defense.⁶⁹ While investigating a possible arson,

⁶⁵ See generally *Coleman-Fuller v. State*, 995 A.2d 985, 992 (Md. Ct. Spec. App. 2010); *Wilder v. State*, 991 A.2d 172, 190 (Md. Ct. Spec. App. 2010); *Wilson*, 195 S.W.3d at 200 (Tex. App. 2006).

⁶⁶ Manfred Schenk, *How to Read Cricket Call Detail Records*, CHERRY BIOMETRICS, <http://www.cherrybiometrics.com/How%20to%20read%20Cricket%20Call%20Detail%20and%20Manfred%20Schenkbio.pdf> (last visited Aug. 31, 2011).

⁶⁷ *Francis v. Fabian*, 669 F. Supp. 2d 970, 987, n.5 (D. Minn. 2009); see *United States v. Benford*, No. 2:09 CR 86, 2010 WL 2346305, at *1 (N.D. Ind. June 8, 2010). But cf. *Wilson v. United States*, 995 A.2d 174, 179 (D.C. 2010) (testifying expert says he was "one hundred percent certain" that at a given time the defendant was "nowhere near Upper Marlboro, Maryland" because a corresponding cell phone call connected to a tower in the District of Columbia which was the tower closest to where the victim's body was found).

⁶⁸ See *supra*, Part II.

⁶⁹ *Benford*, 2010 WL 2346305, at *1.

“investigators questioned Brian Booker who was suspected of starting the fire.”⁷⁰ Booker told investigators that during the time of the fire he was with Nichelle Benford, away from the location where the fire occurred.⁷¹ Investigators subpoenaed Benford’s cell phone records containing historical cell site data which showed she was in the Chicago area during the fire; therefore, rebutting Booker’s claim he was with Benford.⁷² When subpoenaed to testify before a grand jury, Benford corroborated Booker’s alibi in contradiction of what law enforcement recently learned from her cell site records.⁷³ In Benford’s subsequent prosecution for lying to the grand jury, the court held that an expert’s interpretation of the cell site data was relevant.⁷⁴

[18] Recognizing the accuracy limitations of historical cell site data for determining location, the additional problem exists of proving *who* possessed the cell phone at the time in question.⁷⁵ There may exist a strong inference of possession if the cell phone has a service contract registered to the person whose location the offering party is trying to prove. However, there is still a viable defense that someone other than the phone’s owner used the phone.⁷⁶

⁷⁰ *Id.*

⁷¹ *Id.*

⁷² *Id.* Chicago is 37 miles away from Schererville. *See GOOGLE MAPS*, <http://maps.google.com/> (input “Chicago, Illinois” into the “A” form” and “Schererville, Indiana” into the “B” form).

⁷³ *Benford*, 2010 WL 2346305, at *1.

⁷⁴ *Id.* at *1-2.

⁷⁵ *See FISHMAN & MCKENNA, supra* note 3, § 28:12; *see also State v. Hayes*, 2010 WL 5344882, at *6 (Tenn. Crim. App. Dec. 23, 2010) (“Detective Fitzgerald agreed that the cell phone records did not show who was actually using the phone in question.”).

⁷⁶ *See Hayes*, 2010 WL 5344882, at *6.

[19] In the case of pre-paid cell phones, the inference of who possessed the phone may be much weaker. A pre-paid cell phone does not require the user to sign a contract or receive a billing statement from the cellular company, and the user may purchase the phone over the counter at any retailer.⁷⁷ In lieu of a service contract, pre-paid cell phone users purchase minutes and upload them into the phone.⁷⁸ Accordingly, it is easy to activate pre-paid phones under fictitious names, thereby making it difficult to identify the user.⁷⁹ Given their low cost and simple activation, criminals can easily cycle through pre-paid phones to thwart the efforts of law enforcement and continuously change phone numbers to avoid wiretap investigations.⁸⁰ For example, the use of multiple cell phones is a

⁷⁷ See generally Adam Fendelman, *Prepaid Cell Phones: Analysis of Pay as You Go vs. Monthly Contract Plans*, ABOUT.COM (Jan. 1, 2010), <http://cellphones.about.com/od/serviceplananalysis/a/payasyougo.htm>; *GoPhone Plans*, GOPHONE, http://www.wireless.att.com/cell-phone-service/cell-phone-plans/pyg-cell-phone-plans.jsp?wtslotcli ck=1-0050tw-0-2&_requestid=254769 (last visited Sept. 08, 2011); *Virgin Mobile Prepaid Cellular*, PREPAID REVIEWS, <http://www.prepaidreviews.com/virginmobile.html> (last visited Sep. 17, 2011).

⁷⁸ See Fendelman, *supra* note 77.

⁷⁹ See, e.g., United States v. Lomeli, No. 8:10-cr-00158-LES-FG3, 2010 WL 5798589, at *2 (D. Neb. Dec. 9, 2010) (describing the cellular phone used by the defendant as “a prepaid Cricket phone with a fictitious address); Esparza v. Schomig, No. 09-CV-01974-L (JMA), 2010 WL 5535756, at *3 (S.D. Cal. Nov. 19, 2010) (describing how police could determine the number of a target pre-paid phone but not the user); United States v. Dadanovic, No. 09-63-ART, 2010 WL 3620251, at *4 (E.D. Ky. Sept. 10, 2010) (“Further, investigators knew that members of the suspected organization frequently called pre-paid numbers registered in obviously fictitious names.”); Eberle v. State, 942 N.E.2d 848, 853 (Ind. Ct. App. 2011); Commonwealth v. Miranda, Nos. 09-10935, 09-10936, 2011 WL 941237, at *2, n.10 (Mass. Super. Ct. Jan. 19, 2011) (“Drug dealers make use of such pre-paid cellular phones because they do not require contracts . . . making it more difficult to identify the user of the cell phone.”).

⁸⁰ See Ford v. State, No. 02-09-00112-CR, 2010 WL 4261601, at *2 (Tex. App. Oct. 28, 2010) (discussing how pre-paid phones that are used in this manner have attained the nickname “burners” because once either the illegal purpose of using the phone is complete or law enforcement starts investigation the phone the user can simply throw the phone away and get a new one).

common practice for drug dealing where a person uses different phones to communicate with family, suppliers, and customers.⁸¹

[20] Therefore, the identity of a phone's user may create an additional hurdle in the admissibility of cell site records under Federal Rule of Evidence 104. Specifically, Rule 104(b) provides that “[w]hen the relevancy of evidence depends upon the fulfillment of a condition of fact, the court shall admit it upon, or subject to, the introduction of evidence sufficient to support a finding of the fulfillment of the condition.”⁸² This suggests that the location of the phone is not relevant to prove the location of a person until the offering party can first prove that the person possessed the cell phone.⁸³

[21] The following example demonstrates the unique dilemma with pre-paid phones. Buyer calls Seller to purchase drugs on a pre-paid phone. Seller tells Girlfriend that he is going to make a deal and will be back soon. Seller and Buyer meet, the deal goes bad, and Buyer shoots and kills Seller. Buyer flees the scene. There are no witnesses. During the investigation, police talk to Girlfriend and she tells them that Seller left to make a deal and never came home. A review of Seller's phone records

⁸¹ *Accord* United States v. Young, 609 F.3d 348, 355 (4th Cir. 2010); United States v. Rogers, 556 F.3d 1130, 1135 (10th Cir. 2009) (admitting testimony that use of multiple cell phones is common in conducting drug business); United States v. Bailey, 510 F.3d 562, 567 (6th Cir. 2007) (“[D]ealers often carry *two* cell phones – one to contact customers and one to contact suppliers – so that if police trace the call records of their customers it will not lead to their suppliers.”); United States v. Perez, 280 F.3d 318, 341-42 (3rd Cir. 2002) (holding modus operandi of drug dealers and use of cell phones to evade investigation is admissible expert testimony); Commonwealth v. Dancy, 912 N.E.2d 525, 529-30 (Mass. App. Ct. 2009) (upholding trial court’s denial of motion for required finding of not guilty in part because a jury could rationally conclude from police officer’s testimony that the use of multiple cell phones is indicative of drug dealing).

⁸² FED. R. EVID. 104(b).

⁸³ See FED. R. EVID. 104(b); cf. Blackwell v. Wyeth, 971 A.2d 235, 242-43 (Md. 2009) (discussing how it is error for a trial court to admit expert testimony where a condition necessary for proper application of the testimony is not met).

show the last number to contact him was the pre-paid phone. Police contact the phone's service provider and records still exist showing the originating and terminating cell sites for the call to Seller. Although the phone is registered to a fake name, police find the phone last contacted the cell site closest to Neighborhood and begin looking for suspects in the area.

[22] A year passes before the police arrest Suspect who lives in Neighborhood. A search of Suspect's home does not produce the pre-paid phone. Suspect maintains he is innocent and tells police he cannot remember where he was the night of the shooting because it was too long ago. Should the prosecution be allowed to introduce the cell site data from the pre-paid phone as evidence Suspect could be the shooter simply because he lives in Neighborhood? Here, the condition of relevancy is that Suspect used the pre-paid phone. Unless the prosecution can introduce evidence sufficient to support a finding that the Suspect used the pre-paid phone, the location of the phone as interpreted through cell records should be irrelevant.

B. Lay Witness Testimony

[23] In general, lay witness testimony is limited to matters in which the witness has personal knowledge.⁸⁴ This concept is rooted in the common law's assurance that evidence is admitted from its most reliable source.⁸⁵ Under Federal Rule of Evidence 701, opinions or inferences of a lay witness (who is not testifying as an expert) are limited to those: "(a) rationally based on the perception of the witness, (b) helpful to a clear understanding of the witness' testimony or the determination of a fact in

⁸⁴ See FED. R. EVID. 602; see also FED. R. EVID. 602 advisory committee's note ("[A] witness who testifies to a fact which can be perceived by the senses must have had an opportunity to observe, and must have actually observed the fact" is a 'most pervasive manifestation' of the common law insistence upon 'the most reliable sources of information.'").

⁸⁵ See FED. R. EVID. 602 advisory committee's note.

issue, and (c) not based on scientific, technical, or other specialized knowledge within the scope of Rule 702.”⁸⁶ Other opinions by a lay witness are otherwise inadmissible.⁸⁷

[24] The first requirement of Federal Rule 701 is simply that of first-hand knowledge.⁸⁸ The second requirement of the rule ensures that the testimony is “helpful in resolving issues.”⁸⁹ The third requirement of the rule clarifies “any part of a witness' testimony that is based upon scientific, technical, or other specialized knowledge . . . is governed by the standards of Rule 702” and cannot come in through 701.⁹⁰ The difference in the requirements of Rule 701 and 702 reflects the distinction that lay witness testimony “results from a process of reasoning familiar in everyday life,” whereas expert testimony “results from a process of reasoning which can be mastered only by specialists in [a given] field.”⁹¹ Therefore, assuming knowledge and helpfulness are satisfied, a lay witness should be able to testify about cell site records only if they do not implicate scientific, technical, or other specialized knowledge.⁹²

[25] *Perez v. State*, a decision from the Florida Court of Appeals, provides a good example of lay witness testimony about cell records consistent with the Federal Rules of Evidence.⁹³ Over the defendant’s

⁸⁶ FED. R. EVID. 701.

⁸⁷ See also *Beech Aircraft Corp. v. Rainey*, 488 U.S. 153, 168-69 (1988) (noting that the traditional requirement that lay witness testimony is restricted to facts and not opinions serves like a best evidence rule) (citation omitted); cf. FED. R. EVID. 701.

⁸⁸ FED. R. EVID. 701 advisory committee’s note.

⁸⁹ *Id.*

⁹⁰ *Id.*

⁹¹ *Id.*

⁹² *Id.*

⁹³ See generally *Perez v. State*, 980 So. 2d 1126, 1131 (Fla. Dist. Ct. App. 2008).

objection at trial, records custodians from Sprint-Nextel and Metro PCS testified to the time phone calls were placed, the location of the cell sites receiving the calls, and that “persons making and receiving cell calls would physically be not more than three miles from the receiving tower.”⁹⁴ The custodians then compared the locations of the cell sites on a map.⁹⁵ On appeal, the defendant argued that this testimony was erroneous because the witnesses lacked the requisite “expertise or personal knowledge.”⁹⁶

[26] The District Court of Appeals of Florida held that the custodians’ testimony did not reflect expert opinions because it only provided general information on how to interpret phone records and how the records reflect cell sites.⁹⁷ Accordingly, the jury did not need an expert to help them determine the location of the cell sites on a map.⁹⁸ It appeared important to the court that the testimony “did not reveal the precise location within [each cell’s coverage] radius from which the calls were generated.”⁹⁹ This suggests the testimony was acceptable from lay witnesses because it left the jury to infer the location of the defendant with respect to crime based on the state’s case as a whole, rather than drawing the inference for them based solely on cell phone records.¹⁰⁰

⁹⁴ See *id.* at 1129, 1131.

⁹⁵ See *id.* at 1131.

⁹⁶ *Id.*

⁹⁷ See *id.* at 1131-32.

⁹⁸ See *Perez*, 980 So. 2d at 1132.

⁹⁹ See *id.* at 1131.

¹⁰⁰ See *id.* at 1132.

[27] In *State v. Hayes*, the Court of Criminal Appeals of Tennessee went one step further than *Perez* and allowed a lay witness to draw the inference of location.¹⁰¹ In *Hayes*, a detective testified, as a lay witness, that he read cell site locations from phone records and plotted them on a map.¹⁰² From this, he inferred that the defendant travelled in a path consistent with his commission of the crime.¹⁰³ The detective conceded he was not an expert in cell site technology and subsequently, the court held this testimony did not require an expert since “a lay person could plot the locations of the [cell sites] on a map and draw the same inference,” and it “did not require specialized knowledge . . .”¹⁰⁴

[28] The distinction between the outcomes in *Perez* and *Hayes* is subtle, yet marks two divergent paths in the admissibility of historical cell site testimony. *Perez* correctly limited lay testimony to discuss the general features of phone records and cell sites. *Hayes*, however, went one step too far by allowing the lay witness to testify to the intra-cell site position of a phone user because the testimony requires specialized knowledge that relates to the scientific and technological features of cell sites. Therefore, courts should use caution to properly limit the scope of lay witness testimony to prevent juries from accoring improper weight to unqualified opinions.

C. Expert Testimony

[29] The advantage of offering an expert’s testimony over that of a lay witness is that experts have “wide latitude to offer opinions, including

¹⁰¹ See *State v. Hayes*, No. M2008-02689-CCA-R3-CD, 2010 WL 5344882, at *10 (Tenn. Crim. App. Dec. 23, 2010).

¹⁰² See *id.* at *5, *10.

¹⁰³ See *id.*

¹⁰⁴ *Id.* at *10.

those that are not based on firsthand knowledge or observation.”¹⁰⁵ Additionally, experts may impress jurors, causing jurors to give greater weight to the expert evidence introduced.¹⁰⁶

1. Overview of Federal Rule 702

[30] Federal Rule of Evidence 702 governs the admissibility of expert testimony and has several requirements.¹⁰⁷ First, expert testimony is proper when it concerns “scientific, technical, or other specialized knowledge” that will “assist the trier of fact to understand the evidence or to determine a fact in issue”¹⁰⁸ The latter part of this requirement might also be viewed as an initial threshold of relevancy.¹⁰⁹ Second, the witness must qualify as an expert from “knowledge, skill, experience, training, or education”¹¹⁰ Finally, the testimony may take the form of “an opinion or otherwise” if the testimony is “based upon sufficient facts or data,” is produced from “reliable principles and methods,” and the expert has “applied the principles and methods reliably to the facts of the case.”¹¹¹ The underlying purpose of Rule 702 is to engage the trial judge in an important gate-keeping function to exclude expert testimony that is either unreliable or unhelpful.¹¹²

¹⁰⁵ Daubert v. Merrell Dow Pharm, Inc., 509 U.S. 579, 592 (1993). Compare FED. R. EVID. 701, with FED. R. EVID. 702, and FED. R. EVID. 703.

¹⁰⁶ See Reed v. State, 391 A.2d 364, 370 (Md. 1978) (“[S]cientific proof may in some instances assume a posture of mystic infallibility in the eyes of a jury.”).

¹⁰⁷ See FED. R. EVID. 702.

¹⁰⁸ *Id.*

¹⁰⁹ See FED. R. EVID. 401; FED. R. EVID. 402.

¹¹⁰ FED. R. EVID. 702.

¹¹¹ See *id.*

¹¹² FED. R. EVID. 702 advisory committee’s note.

[31] In *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the Supreme Court of the United States enumerated general factors to help a trial court assess whether scientific reasoning or methodology is valid and properly applied to a case.¹¹³ These factors include: (1) “whether it can be (and has been) tested;” (2) “whether the theory or technique has been subjected to peer review and publication;” (3) whether there is a “known or potential rate of error” and “standards controlling the techniques operations;” (4) and whether the methodology has received “general acceptance” within the scientific community.¹¹⁴ The Supreme Court later extended *Daubert* beyond scientific reasoning to testimony based on technical or other specialized knowledge in *Kumho Tire Co., Ltd. v. Carmichael*.¹¹⁵ None of the *Daubert* factors are dispositive; therefore, a trial court’s inquiry will depend on the specific circumstances.¹¹⁶ When making a determination, a court must “focus . . . solely on principles and methodology, not on the conclusions that they generate.”¹¹⁷ This is not to say, however, that

¹¹³ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 592-93 (1993).

¹¹⁴ See *id.* at 593-94.

¹¹⁵ See *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 137, 147 (1999); see also *United States v. Hankey*, 203 F.3d 1160, 1167-68 (9th Cir. 2000) (noting there is no longer a distinction under Rule 702 between “scientific” testimony and testimony based on “technical” or “other specialized knowledge”).

¹¹⁶ *Kumho Tire*, 526 U.S. at 141 (1999) (“[T]he test of reliability is ‘flexible,’ and *Daubert*’s list of specific factors neither necessarily nor exclusively applies to all experts or in every case.”); see *Daubert*, 509 U.S. at 579, 593 (“Publication (which is but one element of peer review) is not a *sine qua non* of admissibility; it does not necessarily correlate with reliability”). But, submission to the scrutiny of the scientific community is a component of “good science,” in part because it increases the likelihood that substantive flaws in methodology will be detected.

Id. at 594 (“Widespread acceptance can be an important factor in ruling particular evidence admissible, and ‘a known technique which has been able to attract only minimal support within the community,’ . . . may be properly viewed with skepticism.”).

¹¹⁷ *Daubert*, 509 U.S. at 595.

conclusions and methodology are completely independent of one another.¹¹⁸

[32] In *Gen. Electric Co. v. Joiner*, the U.S. Supreme Court held that a court might reject an expert's testimony where "there is simply too great an analytical gap between the data and the opinion proffered."¹¹⁹ Robert Joiner's work exposed him to polychlorinated biphenyls (PCB's) and he claimed this exposure caused his cancer.¹²⁰ Joiner would put his hands in fluids containing PCB's and occasionally some would splash into his eyes or mouth.¹²¹ The trial court denied Joiner's attempt to offer expert testimony about a study where infant mice developed cancer after being injected with "highly concentrated[,] massive doses" of PCB's directly into their stomachs.¹²² The Supreme Court ruled the trial court did not abuse its discretion since this animal study was too dissimilar to the facts of Joiner's case; Joiner was an adult human whereas the study was on infant mice, the amount of PCB exposure was drastically different, and the type of cancer that developed was different.¹²³

¹¹⁸ *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997).

¹¹⁹ See *id.*; see also *Barnes v. Cont'l Tire N. Am. Inc.*, No. C05-5214 RBL, 2006 WL 2076561, at *1 (W.D. Wash. 2006) ("In determining whether expert testimony is sufficiently reliable the Court can consider whether the expert has unjustifiably extrapolated from an accepted premise to an unfounded conclusion.").

¹²⁰ See *Joiner*, 522 U.S. at 139.

¹²¹ See *id.*

¹²² See *id.* at 137.

¹²³ See *id.* at 144-45.

2. Application to historical cell data

a. Scientific, technical, or specialized knowledge?

[33] The first step of analysis under Rule 702 is to determine whether testimony concerns “scientific, technical, or other specialized knowledge.”¹²⁴ A witness that interprets historical cell site data should be certified as an expert if they employ scientific, technical, or other specialized knowledge.

[34] In *Wilder v. State*, the trial court admitted lay testimony of the lead detective who extensively discussed historical cell phone analysis to create a map plotting the defendant’s movements and proximity to the crime scene at the time of the shooting.¹²⁵ The detective testified in detail to the meaning of information contained in the cell records, the usefulness and capability of using cell records to track a person, and his method of using a software program to plot the location of cell phone calls and the movement of the defendant.¹²⁶ On appeal, the defendant contended that an expert witness should have presented this testimony.¹²⁷

[35] In ruling on this issue, the Maryland Court of Special Appeals drew an important distinction.¹²⁸ Although authority supports admitting law enforcement’s lay testimony about the location of cell sites, an expert witness is required to explain the use of cell records to determine location of the call.¹²⁹ The information contained in cell phone bills, such as the

¹²⁴ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 589 (1993).

¹²⁵ See *Wilder v. State*, 991 A.2d 172, 180, 187-88 (Md. Ct. Spec. App. 2010).

¹²⁶ See *id.* at 192-93.

¹²⁷ See *id.* at 196.

¹²⁸ See generally *id.* at 196, 200.

¹²⁹ See *id.* at 198.

date or time of calls and whether a call was inbound or outbound, has become generally understood and does not need to be admitted into evidence though an expert.¹³⁰ However, this does not extend to allowing a lay witness to offer opinion testimony about the location of a phone within a cell site.¹³¹ Translating information contained in cell records into locations where the cell phone was used requires “some specialized knowledge or skill . . . that is not in the possession of the [jury.]”¹³² Accordingly, the *Wilder* court held that the admission of the detective’s testimony was reversible error and should only have been admitted through an expert.¹³³

[36] Similarly, the United States Court of Appeals for the Tenth Circuit held in *U.S. v. Yeley-Davis* that it was error for the trial court to admit lay testimony from a police officer about how cell sites processed calls.¹³⁴ The court recognized that “testimony concerning how cell phone towers operate constitute[s] expert testimony because it involve[s] specialized knowledge not readily accessible to any ordinary person.”¹³⁵

b. Who qualifies as an expert?

[37] A witness must qualify as an expert from “knowledge, skill, experience, training, or education.”¹³⁶ *Kumho Tire* states that, when

¹³⁰ See *Wilder*, 991 A.2d at 199.

¹³¹ See, e.g., *id.* at 200.

¹³² *Id.* at 200.

¹³³ See *id.* at 200; see also *Coleman-Fuller v. State*, 995 A.2d 985, 1010 (Md. Ct. Spec. App. 2010) (applying the holding in *Wilder* the court found a detective’s testimony inadmissible because he was not qualified as an expert).

¹³⁴ See *United States v. Yeley-Davis*, 632 F.3d 673, 685 (10th Cir. 2011).

¹³⁵ *Id.* at 684.

¹³⁶ FED. R. EVID. 702.

certifying an expert, the issue is not whether his field of expertise is generally considered reliable, but rather more specifically whether this expert has sufficient knowledge and has reliably drawn conclusions helpful in this case.¹³⁷ This is especially important with respect to cell phone tracking where the reliability of the underlying scientific or technical methodology is not in major dispute. In this case, the gravamen of attacks on experts should focus on the expert's personal knowledge and experience.¹³⁸ In evaluating testimony regarding an expert's experience, it may prove particularly relevant to assess the expert's rate of error, general acceptance of the methodology employed, and how the expert's preparation relates to others in the field.¹³⁹ Indeed, industry standards have become increasingly important when evaluating experience-based testimony.¹⁴⁰ This is because although an expert can self-proclaim his methodology as reliable, nothing requires a court to accept an expert's *ipse dixit*.¹⁴¹

¹³⁷ See *Kumho Tire Co. v. Carmichael*, 526 U.S. 137, 156 (1999).

¹³⁸ See *Id.* at 150; *Rivera v. Mill Hollow Corp.*, No. 96CIV.8150(TPG), 2000 WL 1175001, at *1 (S.D.N.Y. Aug. 18, 2000) (discussing *Kumho Tire*).

¹³⁹ See *Kumho Tire*, 526 U.S. at 151; *Groobert v. President of Georgetown Coll.*, 219 F. Supp. 2d 1, 8 (D.D.C. 2002).

¹⁴⁰ See *Kumho Tire*, 526 U.S. at 157.

We have found no indication in the record that other experts in the industry use Carlson's two-factor test or that tire experts such as Carlson normally make the very fine distinctions about, say, the symmetry of comparatively greater shoulder tread wear that were necessary, on Carlson's own theory, to support his conclusions. Nor, despite the prevalence of tire testing, does anyone refer to any articles or papers that validate Carlson's approach. *Id.*

¹⁴¹ See *id.* (citing *Gen. Elec. Co. v. Joiner*, 522 U.S. 136, 146 (1997)); see also *Barnes v. Cont'l Tire N. Am. Inc.*, No. C05-5214 RBL, 2006 WL 2076561, at *1 (W.D. Wash. July 24, 2006) (admitting expert testimony upon determination it "has a sufficient factual basis").

[38] Three types of expert witnesses may testify regarding cell site location evidence: law enforcement; agents from cellular companies; and a hybrid approach featuring some combination of the two.¹⁴² Among law enforcement, a wide spectrum of background and experience has been found sufficient to qualify an expert. On the more qualified end of the spectrum, a federal district court admitted as an expert a witness who: (1) worked nine years as an FBI agent whose work focused on cell phone tracking; (2) completed two FBI courses on cellular technology and networks and five others on radio frequency theory and analyzing cell phone calls; (3) taught an FBI three-day course to other agents five times on cell phone tracking; and (4) was in the middle of a master's degree in geospatial technology.¹⁴³ This expert testified to methods and devices he used to approximate cell sites' coverage areas and to determine the point where a hand-off occurred between two sites.¹⁴⁴ From this, he could narrow down the area from which a cell phone call was made.¹⁴⁵ On the other hand, a Texas state court admitted a less qualified expert who: (1) worked four years as a police officer; (2) attended a three-day course in cell phone tracking; and (3) performed tracking analysis twelve times previously.¹⁴⁶ However, in admitting this witness as an expert, the court noted that the witness's testimony only concerned the general vicinity of the cell phone and did not try to determine a more precise location.¹⁴⁷ Therefore, it appears that the precision of the expert's testimony is dependent on their qualifications.

¹⁴² See generally *infra* notes 145-62 and accompanying text.

¹⁴³ See United States v. Allums, No. 2:08-CR-30 TS, 2009 WL 806748, at *2 (D. Utah March 24, 2009).

¹⁴⁴ See *id.* at *1.

¹⁴⁵ See *id.*

¹⁴⁶ See Saenz v. State, No. 13-10-00216-CR, 2011 WL 578757, at *3 (Tex. App. Feb. 17, 2011).

¹⁴⁷ See *id.* at *4.

[39] Likewise, the qualifications of agents from cellular companies vary.¹⁴⁸ One federal district court admitted an expert employed as a radio frequency engineer for Ericsson whose duties included management of the cellular network and determining cell site coverage.¹⁴⁹ Part of his job included mapping coverage areas for business purposes including sales.¹⁵⁰ The court allowed this expert to testify about a coverage map he created to approximate the defendant's location not just based on his experience, but also because of his personal knowledge about the coverage areas of the particular towers that were the subject of his testimony.¹⁵¹

[40] Other courts have admitted cellular company employees as experts based on their experience with phone records.¹⁵² One court admitted an expert who, despite admitting to a lack of specialized knowledge in cellular technology or corresponding scientific theories: (1) worked four years for Sprint; (2) her job duties included interpreting customer records to determine the cell sites and addresses from which calls obtained their signals; (3) had four to six months training from Sprint in electronic surveillance; and (4) performed tracking analysis frequently to assist law enforcement and 911 operators.¹⁵³ Another court admitted as an expert a store manager for Verizon based on his training and experience with: (1) phone records; (2) phone servicing; (3) technical support; and (4) how calls are transmitted through Verizon's network.¹⁵⁴

¹⁴⁸ See *infra* notes 151-56 and accompanying text.

¹⁴⁹ See United States v. Benford, No. 2:09 CR 86, 2010 WL 2346305, at *2 (N.D. Ind. June 8, 2010).

¹⁵⁰ See *id.* at *3.

¹⁵¹ See *id.* at *2-3.

¹⁵² See, e.g., Cooper v. State, 45 So. 3d 490, 492-93 (Fla. Dist. Ct. App. 2010); Wilson v. State, 195 S.W.3d 193, 196-97 (Tex. App. 2006).

¹⁵³ Wilson, 195 S.W.3d at 200-01.

¹⁵⁴ See Cooper, 45 So. 3d at 493.

[41] Additionally, *Wilder* leaves open the door for law enforcement to give lay testimony when accompanied by a sponsoring expert witness.¹⁵⁵ In *State v. Banks*, the trial court admitted the testimony of three witnesses placing the defendant near the crime scene.¹⁵⁶ First, an expert from Sprint/Nextel testified regarding how cell sites handle calls and the extent to which cell site data can determine call locations.¹⁵⁷ Second, a records custodian for Sprint/Nextel testified and provided the records for the defendant's cell phone.¹⁵⁸ Third, a criminal intelligence analyst who worked for the Attorney General's office used the information provided by Sprint/Nextel to create a map tracing the defendant's movements on the day in question.¹⁵⁹ In upholding this admission of witnesses and testimony, the Court of Appeals of Ohio stated that this would satisfy *Wilder*'s hybrid approach.¹⁶⁰

¹⁵⁵ See *Wilder v. State*, 991 A.2d 172, 197 (Md. Ct. Spec. App. 2010); *State v. Banks*, Nos. 09AP-1087, 09AP-1088, 2010 WL 4793354, at *12 (Ohio Ct. App. Nov. 23, 2010) (discussing *Wilder*); see also *United States v. Sanchez*, 586 F.3d 918, 929 n.27 (11th Cir. 2009) (admitting the testimony of a Miami-Dade detective in conjunction with the testimony of the MetroPCS records custodian).

¹⁵⁶ See *Banks*, 2010 WL 4793354, at *4.

¹⁵⁷ See *id.*

¹⁵⁸ See *id.*

¹⁵⁹ See *id.* Although this witness was not qualified as an expert by the prosecution, it was within the trial court's discretion to treat him as one based on training and experience. *See id.* at *12.

¹⁶⁰ See *Banks*, 2010 WL 4793354, at *12.

c. Reliability of principles and methodology

[42] Even if an expert is qualified, a party can still object to the reliability of methods used by the expert to draw conclusions.¹⁶¹ At least two federal courts have held *Daubert* hearings to assess the reliability and relevance of expert testimony based on historical cell site interpretation.¹⁶² In *United States v. Allums*, the prosecution’s proposed expert testimony concerned a method of approximating cell sites’ coverage areas that determined the point of a hand-off between two sites to indicate the area in which a call was placed.¹⁶³ First, the expert obtained the originating cell sites for each call made from the defendant’s phone and purchased the same phone from the same service provider.¹⁶⁴ Second, he put the phone in “engineering mode” so it would display in real-time the connecting cell site.¹⁶⁵ Simultaneously, he used a device called a “Stingray” to measure from his location the cell site with the strongest signal.¹⁶⁶ Finally, the expert drove around the area surrounding the cell sites to approximate its coverage area and points of handing off.¹⁶⁷ He applied this method to the

¹⁶¹ See Wilder v. State, 991 A.2d 172, 188-89 (Md. Ct. Spec. App. 2010) (“At the beginning of trial, the defense moved *in limine* to exclude testimony about how the police managed to track [the defendant’s] movements . . . by the use of cellular telephone records.”).

¹⁶² See United States v. Benford, No. 2:09 CR 86, 2010 WL 2346305, at *2-3 (N.D. Ind. June 8, 2010); United States v. Allums, No. 2:08-CR-30 TS, 2009 WL 806748, at *1-2 (D. Utah March 24, 2009); see also Pullin v. State, 534 S.E.2d 69, 71 (Ga. 2000) (upholding the scientific validity of expert testimony concerning cell site tracking analysis).

¹⁶³ See *Allums*, 2009 WL 806748, at *1.

¹⁶⁴ See *id.*

¹⁶⁵ See *id.*

¹⁶⁶ See *id.*

¹⁶⁷ See *id.*

historical cell site data he obtained to determine the approximate location of each call made by the defendant.¹⁶⁸

[43] The United States District Court for the District of Utah held that this methodology was reliable under *Daubert* because the FBI had used it successfully to capture fugitives in hundreds of previous investigations.¹⁶⁹ Furthermore, consistent with the *Daubert* factors, this methodology was tested and generally accepted by law enforcement.¹⁷⁰ Although the court was not presented with peer review or rates of error for this expert's methods, the court held that previous success of the methodology was sufficient to establish reliability.¹⁷¹

[44] In *Benford*, the defendant challenged the expert's methodology of using a "prediction tool" to create maps, based on her call records of coverage areas where the defendant could have been.¹⁷² The United States District Court for the Northern District of Indiana deemed his methodology reliable because: (1) the expert relied on data and reports supplied by the service provider which are "of a type reasonably relied upon by experts in the field"; (2) he normally prepares these maps for business purposes and not just for litigation; and (3) the service provider constantly runs tests on phones and tracks their connections to cell sites to keep predictions of coverage area "as accurate and up-to-date as possible."¹⁷³

¹⁶⁸ See *Allums*, 2009 WL 806748, at *1.

¹⁶⁹ See *id.* at *2.

¹⁷⁰ See *id.*

¹⁷¹ See *id.*

¹⁷² See United States v. Benford, No. 2:09 CR 86, 2010 WL 2346305, at *3 (N.D. Ind. June 8, 2010).

¹⁷³ *Id.* (crediting the expert's claims that his methodology was not disputed in his technical community).

[45] Unlike real-time cell phone tracking, the reliability of which is not questioned upon capturing the target of its investigation, the methodology employed in historical cell site analysis should be properly scrutinized. Judges should consider these methods reliable only when they are actually employed successfully by law enforcement in the field, not solely upon an unsubstantiated belief in their scientific reliability. Methods employed by service providers should be granted more weight than law enforcement because they are usually less biased and based on specialized knowledge of their own networks. Properly ordering these considerations will prevent backward looking methods from bootstrapping reliability.

D. OTHER CONSIDERATIONS

1. Procedural Issues

[46] A party against whom cell site evidence is offered should consider bringing a motion *in limine* to exclude it on grounds of admissibility.¹⁷⁴ Otherwise, a party should timely raise an objection at trial on *Daubert* grounds to preserve the right to object to scientific or technical evidence and preserve the issue on appeal.¹⁷⁵

2. Weight vs. Admissibility; Probative Value vs. Unfair Prejudice

[47] The standard for admitting expert testimony under Federal Rule of Evidence 702 is liberal and flexible.¹⁷⁶ Although this appears to favor the offering party, the objecting party should not forget that the *Daubert*

¹⁷⁴ Daniel K. Gelb, *An Approach to Cell Phone Evidence for Criminal Defense Attorneys*, CHAMPION, Nov. 2009, at 28, 32.

¹⁷⁵ See FED. R. EVID. 103(a); cf. Questar Pipeline Co. v. Grynberg, 201 F.3d 1277, 1289-90 (10th Cir. 2000) (discussing the possibility of a party waiving their right to appeal without a timely objection).

¹⁷⁶ Groobert v. President and Dir. of Georgetown Coll., 219 F. Supp. 2d 1, 7 (D.D.C. 2002) (citing Kumho Tire Co., 526 U.S. 137 1999).

factors for assessing reliability are not exclusive.¹⁷⁷ Thus, creative counsel will have room for argument depending on the expert in question, issues of the case, and methodology used.¹⁷⁸

[48] When arguing against the admission of an expert's testimony, a party should not conflate the questions of weight and admissibility.¹⁷⁹ An expert's shortcomings in his analysis do not necessarily render his methodology completely unreliable and inadmissible, rather the jury may simply accord less weight to his testimony.¹⁸⁰ Indeed, as the *Daubert* court recognized, “[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence.”¹⁸¹ For example, when an expert approximates call location based on data from the closest processing cell site, counsel may cross-examine the expert about other factors affecting signal strength and the expert's basis of knowledge such as: (1) whether the expert has inspected this cell site's features that affect call processing; or (2) whether the expert has only reviewed phone records lacking such information.¹⁸²

¹⁷⁷ See *id.* (“The Supreme Court has recognized that ‘the factors identified in *Daubert* may or may not be pertinent in assessing reliability; depending on the nature of the issue, the expert’s particular expertise, and the subject of his testimony.’”).

¹⁷⁸ See *id.*

¹⁷⁹ See *id.*

¹⁸⁰ See *Voilas v. Gen. Motors Corp.*, 73 F. Supp. 2d 452, 462 (D.N.J. 1999) (explaining how flaws in an expert's testimony should be “tested in the crucible of the adversarial system”).

¹⁸¹ *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 596 (1993).

¹⁸² See *United States v. Allums*, No. 2:08-CR-30 TS, 2009 WL 806748, at *2 (D. Utah Mar. 24, 2009); *United States v. Allums*, No. 2:08-CR-30 TS, 2009 WL 922185, at *2 (D. Utah Mar. 31, 2009).

[49] Although relevant, Federal Rule of Evidence 403 excludes an expert's testimony if "its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence."¹⁸³ Unlike lay testimony, expert testimony carries risks because it can be powerful, misleading, and difficult to evaluate.¹⁸⁴ For example, an expert's general opinion on how to decide the case, or testimony to facts rather than opinions, should raise concerns of prejudice outweighing probative value.¹⁸⁵

[50] If improperly admitted, such evidence may "assume a posture of mystic infallibility in the eyes of a jury,"¹⁸⁶ and unlike lay witnesses, it is more difficult to discredit an expert.¹⁸⁷ Due to these risks, a trial judge should carefully weigh the prejudice and probative value of expert testimony under Rule 403.

3. Hearsay; Foundational Issues

[51] Under the Federal Rules of Evidence, hearsay is inadmissible unless an exception exists within the Rules or other law.¹⁸⁹ Hearsay is an out-of-court statement offered to prove the truth of the matter asserted.

¹⁸³ FED. R. EVID. 403.

¹⁸⁴ *Daubert*, 509 U.S. at 595 (1993).

¹⁸⁵ See *Tuli v. Brigham & Women's Hosp., Inc.*, 592 F. Supp. 2d 208, 212 (D. Mass. 2009).

¹⁸⁶ *Reed v. Maryland*, 391 A.2d 364, 370 (Md. 1978) (*quoting United States v. Addison*, 498 F.2d 741, 744 (D.C. Cir. 1974)).

¹⁸⁷ See *Blackwell v. Wyeth*, 971 A.2d 235, 245 (Md. 2009).

¹⁸⁸ *Daubert*, 509 U.S. at 595.

¹⁸⁹ See FED. R. EVID. 802.

¹⁹⁰ See FED. R. EVID. 801.

Hence, cell phone records offered to prove their contents are hearsay.¹⁹¹ They may be admissible, however, under the business records exception to the hearsay rule.¹⁹²

[52] Federal Rule of Evidence 803(6) exempts business records from exclusion under the hearsay rule if the information contained within the records was known at the time the records were made and if the records were created and stored in the regular course of business, unless preparation of the records indicates a lack of trustworthiness.¹⁹³ Records prepared in anticipation of litigation by a business fall outside the scope of Rule 803(6) because they lack trustworthiness as the self-serving motives in their creation outweigh the principle of accuracy that underscores the exception for regularly recorded business activities.¹⁹⁴ Accordingly, courts have admitted cell phone records under the business records exception to the hearsay rule.¹⁹⁵

[53] As a foundation for admissibility, either a custodian or other qualified witness must authenticate these records or the business must certify the records.¹⁹⁶ Failure to properly authenticate cell phone records

¹⁹¹ Fry v. State, 885 N.E.2d 742, 747 (Ind. Ct. App. 2008).

¹⁹² See FED. R. EVID. 803(6) (defining “Records of Regularly Conducted Activity”).

¹⁹³ *Id.*

¹⁹⁴ CLIFFORD S. FISHMAN & ANNE T. MCKENNA, 5 JONES ON EVIDENCE § 33:17 (7th ed. 2010); see also Palmer v. Hoffman, 318 U.S. 109, 113 (1943).

¹⁹⁵ See, e.g., United States v. Yeley-Davis, 632 F.3d 673, 678 (10th Cir. 2011); United States v. Sanchez, 586 F.3d 918, 928-29 (11th Cir. 2009); United States v. Wills, 346 F.3d 476, 490 (4th Cir. 2003).

¹⁹⁶ FED. R. EVID. 803(6); FED. R. EVID. 902(11); FED. R. EVID. 902(12). For examples of affidavits authenticating cell phone records, see *Fry*, 885 N.E.2d at 747; *Smith v. State*, 839 N.E.2d 780, 785-86 (Ind. Ct. App. 2005).

prevents a witness from testifying to their contents.¹⁹⁷ With respect to cell phone tracking, a unique authentication issue arises when a witness testifies about a tracking map created from cell phone records.¹⁹⁸ If the witness is a custodian or otherwise qualified to authenticate the underlying records and subsequently authenticates the records, he may testify about the substance of the tracking map and how he created it without admitting the actual phone records into evidence.¹⁹⁹ Otherwise, any analysis of cell phone records conducted by a witness is inadmissible without first authenticating the underlying records through a sponsoring witness or certifying affidavit.²⁰⁰

[54] In almost all cases cell phone records will be admissible under the business records exception to the hearsay rule. Therefore, the hurdle to admissibility lies in authentication. Tracking maps created from cell phone records should only be admitted with proper authentication of the underlying records. This prevents parties from offering evidence that may contain hearsay or lack a proper foundation, and would allow a witness to testify beyond the scope of what is actually supported by the evidence.

¹⁹⁷ See State v. Courtney, 258 S.W.3d 117, 119-20 (Mo. Ct. App. 2008); Miller v. State, 208 S.W.3d 554, 561-63 (Tex. Ct. App. 2006) (finding error where trial court admitted cell phone records without testimony or affidavit from service provider's custodian or records or other qualified witness).

¹⁹⁸ See State v. Wright, No. 08-1737, 2010 WL 200052, at *6-7 (Iowa Ct. App. Jan. 22, 2010).

¹⁹⁹ See *id.* at *6-8.

²⁰⁰ See United States v. Keyes, 214 Fed. Appx. 145, 156 (3rd Cir. Jan. 17, 2007) ("[A] proper foundation should have been laid for the phone records analyzed by [the witness]. . .").

V. CONSTITUTIONAL ISSUES

A. Confrontation Clause

[55] The Sixth Amendment of the United States Constitution provides that “[i]n all criminal prosecutions, the accused shall enjoy the right . . . to be confronted with the witnesses against him[.]”,²⁰¹ After a somewhat murky history,²⁰² the Supreme Court of the United States held in *Crawford v. Washington* that the Confrontation Clause guarantees criminal defendants the procedural right to be confronted with witnesses who bear testimony against them.²⁰³ This constitutional right mandates a defendant have the reliability of evidence against him assessed “in a particular manner: by testing in the crucible of cross-examination.”²⁰⁴ “Testimonial” evidence is subject to the Confrontation Clause whereas “nontestimonial” evidence is not.²⁰⁵ Therefore, the government cannot admit testimonial evidence in a criminal trial unless the defendant is confronted with, and given an opportunity to cross-examine, the witness.²⁰⁶ The only two exceptions are: (1) where the witness is unavailable and the defendant has had a prior opportunity to cross-examine them; and (2) the common law doctrine of forfeiture by wrongdoing.²⁰⁷

²⁰¹ U.S. CONST. amend. VI.

²⁰² See generally Randolph N. Jonakait, *The Origins of the Confrontation Clause: An Alternative History*, 27 RUTGERS L.J. 77 (1995).

²⁰³ See, *Crawford v. Washington*, 541 U.S. 36, 42-43 (2004).

²⁰⁴ *Id.* at 61.

²⁰⁵ *Id.* at 68.

²⁰⁶ See *id.*

²⁰⁷ *Giles v. California*, 554 U.S. 353, 368 (2008) (holding that in order to forfeit the right of confrontation, they must have procured the witness’s unavailability for the purpose of preventing testimony; not merely for having caused unavailability); *Crawford*, 541 U.S. at 54.

[56] In *Crawford*, the court loosely defined “testimonial” evidence, but failed to give any comprehensive definition.²⁰⁸ However, the court did state that business records are nontestimonial and later affirmed this notion²⁰⁹ because they are “created for the administration of an entity's affairs and not for the purpose of establishing or proving some fact at trial. . . .”²¹⁰ Accordingly, various state and federal courts have held that affidavits authenticating cell phone records including cell site information are nontestimonial and are admissible at trial without producing a representative from the phone company for cross-examination.²¹¹ Therefore, a defendant will lose a Confrontation Clause challenge for admitting cell phone records unless they can show the purpose in creating the records was for use in a criminal trial, rather than for business.²¹²

B. Fourth Amendment

[57] The Fourth Amendment protects the right of the people from unreasonable searches and seizures.²¹³ Fourth Amendment protections extend to people in areas of life where they have a reasonable expectation

²⁰⁸ See *Crawford*, 541 U.S. at 51, 68.

²⁰⁹ *Melendez-Diaz v. Massachusetts*, 129 S.Ct. 2527, 2539-40 (2009); *Crawford*, 541 U.S. at 76 (Rehnquist, C.J., concurring).

²¹⁰ *Melendez-Diaz*, 129 S.Ct. at 2539-40.

²¹¹ See, e.g., *United States v. Green*, No. 10-10300, 2010 WL 3401485, at *2 (11th Cir. Aug. 31, 2010); *United States v. Flores*, No. 04-51138, 2008 WL 3244071, at *7 (5th Cir. Aug. 7, 2008); *Smith v. State*, 839 N.E.2d 780, 784, n.4 (Ind. Ct. App. 2005); *State v. Lee*, 247 P.3d 470, 480-81 (Wash. Ct. App. 2011).

²¹² See also *United States v. Yele-Davis*, 632 F.3d 673, 679 (rejecting the argument that certain cell phone records were testimonial because they were not bills on the ground that they were still produced and maintained for business purposes).

²¹³ U.S. CONST. amend. IV.

of privacy.²¹⁴ What is knowingly exposed to the public cannot claim Fourth Amendment privacy protections.²¹⁵ Similarly, a person loses an expectation of privacy in information they convey to a third party because they assume the risk that the party could disseminate the information.²¹⁶ Intrusion by the government into an area that lacks a reasonable expectation of privacy is not a “search” within the meaning of the Fourth Amendment and therefore is not prohibited.²¹⁷

[58] The Fourth Amendment makes warrantless searches performed without judicial approval *per se* unreasonable, subject only to a “few specifically established and well-delineated exceptions.”²¹⁸ To protect the people and to sanction Fourth Amendment violations, evidence that is the fruit of an unreasonable search or seizure cannot be used in a criminal trial against the person whose rights were violated.²¹⁹

[59] Thus far, at least two differing views on the Fourth Amendment’s application to historical cell phone data have emerged.²²⁰ Two United States District Courts have held that no reasonable expectation of privacy

²¹⁴ See *Katz v. United States*, 389 U.S. 347, 361 (1967).

²¹⁵ See *id.* at 351.

²¹⁶ See *Smith v. Maryland*, 442 U.S. 735, 743-44 (1979).

²¹⁷ See *Minnesota v. Dickerson*, 508 U.S. 366, 375 (1993); see also *United States v. Place*, 462 U.S. 696, 706-07 (1983).

²¹⁸ *Arizona v. Gant*, 556 U.S. 332 (2009) (quoting *Katz*, 389 U.S. at 357).

²¹⁹ See *Sun v. United States*, 371 U.S. 471, 483 (1963); *Mapp v. Ohio*, 367 U.S. 643, 649, 670-72 (1961).

²²⁰ Compare *United States v. Benford*, No. 2:09 CR 86, 2010 WL 1266507, at *3 (N.D. Ind. Mar. 26, 2010), and *United States v. Suarez-Blanca*, No. 1:07-CR-0023-MHS/AJB, 2008 WL 4200156, at *8 (N.D. Ga. Apr. 21, 2008), with *In re Application of the United States for Historical Cell Site Data*, 747 F. Supp. 2d 827, 846 (S.D. Tex. 2010) [hereinafter *In re Application* 4].

exists in cell phone records because users voluntarily convey the information to the phone company; thus the phone user assumes the risk that the information will be turned over to police.²²¹ Therefore, the courts did not require a warrant to obtain this information.²²²

[60] In contrast, the United States District Court for the Southern District of Texas held that a phone user does not voluntarily convey location information to the phone company when the phone scans the network while turned on or when it connects to the network during a call because the cell sites generate that information automatically.²²³ The court reasoned that the average phone user is unaware that companies could use cell site information to track their location, so they lack the requisite knowledge to assume the risk of disclosure.²²⁴ Accordingly, the court held that a warrantless seizure of “[t]wo months worth of hourly tracking data” was unreasonable because the phone user has a reasonable expectation of privacy in prolonged surveillance of information, which reveals intimate details of the user’s life.²²⁵

[61] Although accepting the prolonged surveillance theory, the United States District Court for the Eastern District of New York provided that a shorter period of surveillance does not raise the same constitutional concerns.²²⁶ The court held that the government’s seeking of historical cell site data for a three-day period and a six-day period, weeks apart, as

²²¹ See *Benford*, 2010 WL 1266507, at *2; *Suarez-Blanca*, 2008 WL 4200156, at *8.

²²² See *Benford*, 2010 WL 1266507, at *3; *Suarez-Blanca*, 2008 WL 4200156, at *11.

²²³ See *In re Application 4*, 747 F. Supp. 2d at 836-37 (S.D. Tex. 2010).

²²⁴ See *id.* at 843.

²²⁵ See *id.* at 846.

²²⁶ See *In re Application of the United States for an Order Authorizing the Release of Historical Cell Site Info.*, No. 11-MC-0113 (JO), 2011 WL 679925, at *2 (E.D.N.Y. 2011) [hereinafter *In re Application 5*].

well as an additional twelve-day period several months later, did not raise the same privacy concerns corresponding to continuous monitoring over longer periods of time.²²⁷ Currently, it appears courts are divided on whether the Fourth Amendment protects historical cell site information.²²⁸ Courts may begin to apply Fourth Amendment protection if the prolonged surveillance argument continues to gain traction.²²⁹

VI. CONCLUSION

[62] Cell site data can track the location of cellular phones if enough information is available to perform triangulation.²³⁰ However, the accuracy of triangulation depends on multiple factors, from the duration of the call to the geography of the region.²³¹ The interpretation of historical cell site data can prove a useful investigative tool, if law enforcement properly recognizes its limits.²³² From such information, law enforcement can determine the general coverage area from which a phone call was placed, but not the precise location within that area.²³³ Historical cell site data can also show that a call was *not* made from a certain area.²³⁴

²²⁷ See *id.* at *2.

²²⁸ Compare *Benford*, 2010 WL 1266507, at *3, and *Suarez-Blanca*, 2008 WL 4200156, at *16, with *In re Application 4*, 747 F. Supp. 2d 827, 846 (S.D. Tex. 2010).

²²⁹ See *United States v. Maynard*, 615 F.3d 544, 558 (D.C. Cir. 2010) (holding that twenty-four hour surveillance of a person's location over a month long period using GPS installed in their car without a warrant violates the Fourth Amendment because a person has a reasonable expectation of privacy from prolonged surveillance of their daily life).

²³⁰ See *In re Application of the United States for Prospective Cell Site Location Info. on a Certain Cellular Tel.*, 460 F. Supp. 2d 448, 451 (S.D.N.Y. 2006).

²³¹ See *supra* Part III.A.

²³² See *supra* Part IV.A.

²³³ See *supra* Part IV.A.

²³⁴ See *supra* Part IV.A.

[63] Once investigators obtain cell site data for a phone, special problems may exist in determining the identity of who used the phone at the time in question. A defendant charged with a crime may prove that someone else possessed their phone or challenge the government to prove they were the unknown user of a pre-paid phone.

[64] Lay witnesses should only testify to generally known information concerning cell phones, such as information contained in cell phone bills. Any analysis used to infer location from cell phone records should come in only through an expert. When challenging an expert, the objecting party should consider the relevance, the expert's qualifications, and reliability of the principles applied in the expert's analysis. If ruled admissible, the objecting party should vigorously cross-examine the expert on methodology to expose its accuracy limitations and the many factors that affect how a cell phone connects along a cellular network. This also includes questioning an expert's basis of knowledge of the phone and cell sites in question. Once the proper subject of expert testimony is ruled admissible, opposing counsel should not forget to object if cell phone records are not properly authenticated.

[65] Constitutional challenges to cell site data are limited.²³⁵ Cell phone records are admissible as nontestimonial business records and will only raise Confrontation Clause concerns if created to prove a past fact for the purpose of prosecution.²³⁶ Fourth Amendment precedent is split and parties should be aware that arguments exist for and against extending privacy protections to cell site data.²³⁷

[66] A party offering expert testimony should recognize the limitations of using historical cell site data to track location in order to adequately

²³⁵ See discussion *supra* Part V.

²³⁶ See *supra* Part V.A.

²³⁷ See *supra* Part V.B.

prepare for and mitigate the effects of cross-examination.²³⁸ If properly incorporated, these records can successfully corroborate or rebut other evidence to help a party win its case. Parties objecting to the admissibility of historical cell site data and related testimony should continue to raise all arguments available as they are gaining recognition. Undoubtedly, the most vulnerable basis for objecting to cell-site data is by attacking lay and expert witness testimony. In the future, courts may qualify more experts whose testimony is based on law enforcement experience in cell phone tracking rather than employment with service providers. Therefore, objections should focus on attacking the methodology used by law enforcement and their knowledge of the cell networks. Hopefully courts will preclude the admission of sub-par tracking testimony that is based on unreliable and unsubstantiated techniques. As the use of cell-site date in criminal investigations steadily increases, courts will face more innovative and creative ways of using this data to investigate, prosecute and convict criminals. However, courts must strive to ensure these methods are consistent with the rules of evidentiary admissibility before they are used more consistently throughout the criminal justice system.

²³⁸ See *supra* Part IV.C.ii.c.